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(54) **METHOD AND SYSTEM FOR AUTOMATED AND CONFIGURABLE REMOTE CACHE REFRESHES**

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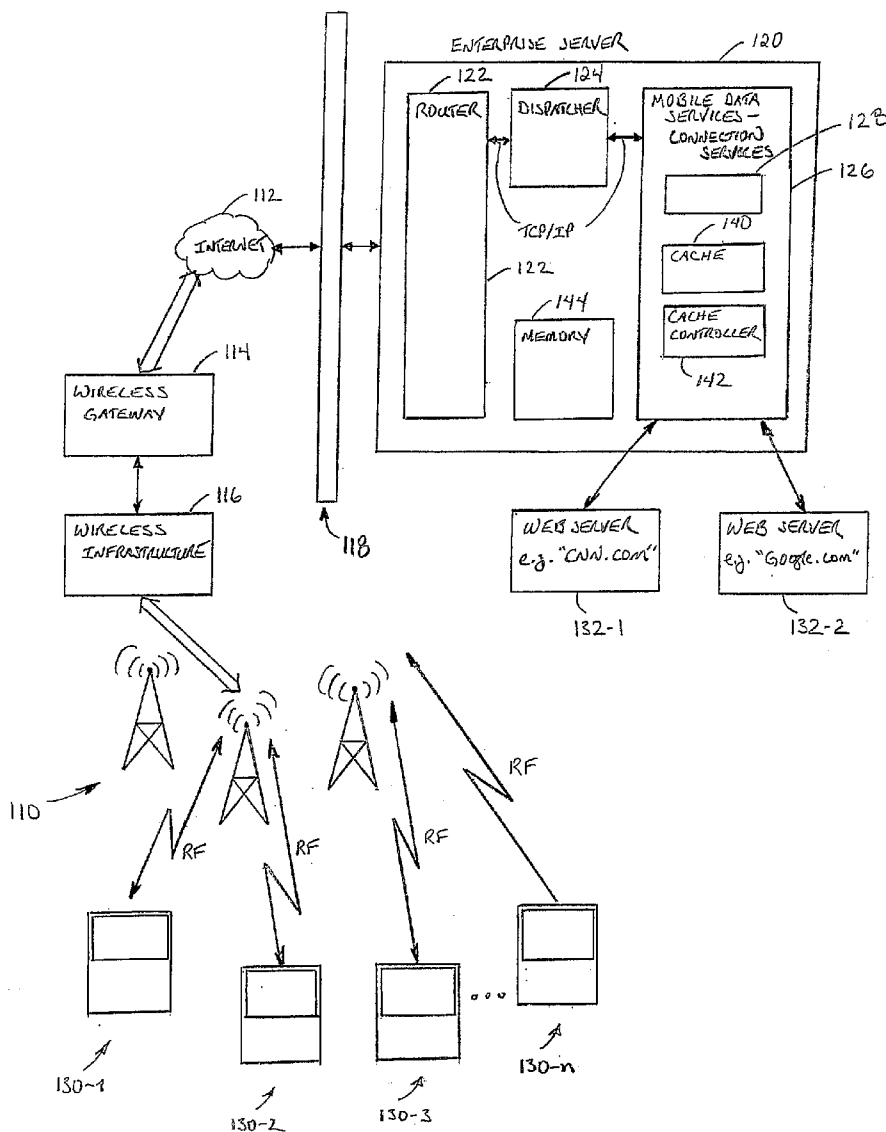**TORONTO, ON M5X 1A4 (CA)**

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(57) **ABSTRACT**

A method and system for enhancing the download of a webpage to a mobile communication device or other type of networked device. The system comprises a module for retrieving a designated webpage from a web server. The system includes a cache for storing a copy of the retrieved webpage and a component for refreshing the cache. The system further includes a module for transmitting the webpage from the cache to the device. The refresh or update frequency for the cache may be defined by a user of the device. The designated webpage may be defined by a user according to a rule or other input parameter.

FIG. 1

FIG. 2

130

300

NEW RULE (GOOGLE NEWS)

NAME: GOOGLE NEWS   ← 340

START: WED   JAN 2   2007   ← 320

END: NEVER   ← 322

FREQUENCY   330

1 PER/MIN   243
1 PER/HOUR ←
1 PER/DAY

WEBSITE: www.google.com   ← 310

NOTES: This is a rule for google news.   350

241

FIG. 3

400

START

RE-ENTER/REDO RULE

OPEN NEW RULE
ON DEVICE
(CACHE CONFIGURATION
SCREEN)
402

IS
RULE VALID
?
404

NO

YES

SEND TO SERVER
(I.C. ENTERPRISE
SERVER)
406

IS
RULE VALID
?
408

NO

GENERATE AND
SEND ERROR
REPORT TO THE
DEVICE
410

IS
WEBSITE
VALID
?
412

NO

STOP PROCESS
411

YES

SAVE CACHE
COPY OF
WEBSITE
414

RETURN
CONFIRMATION TO
THE DEVICE
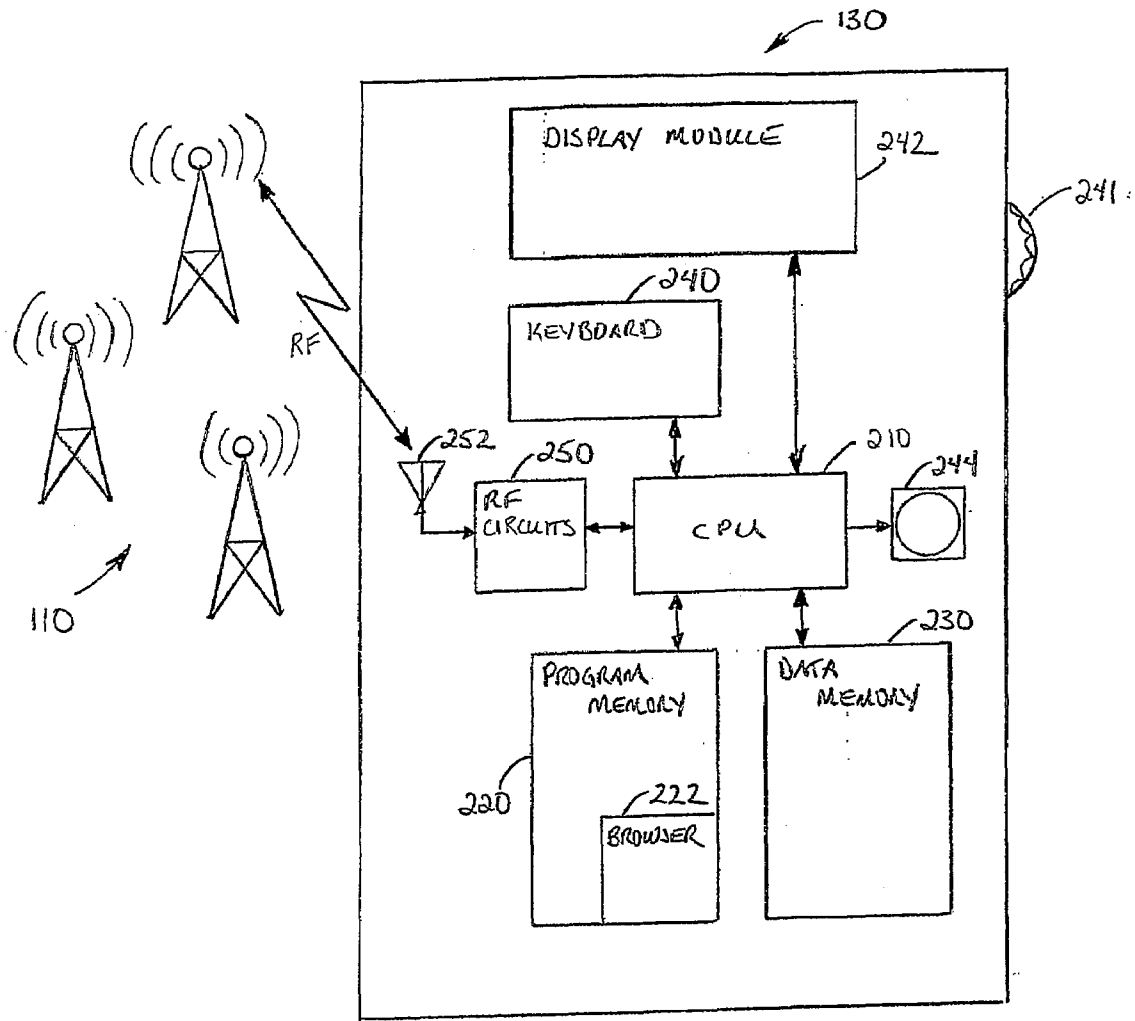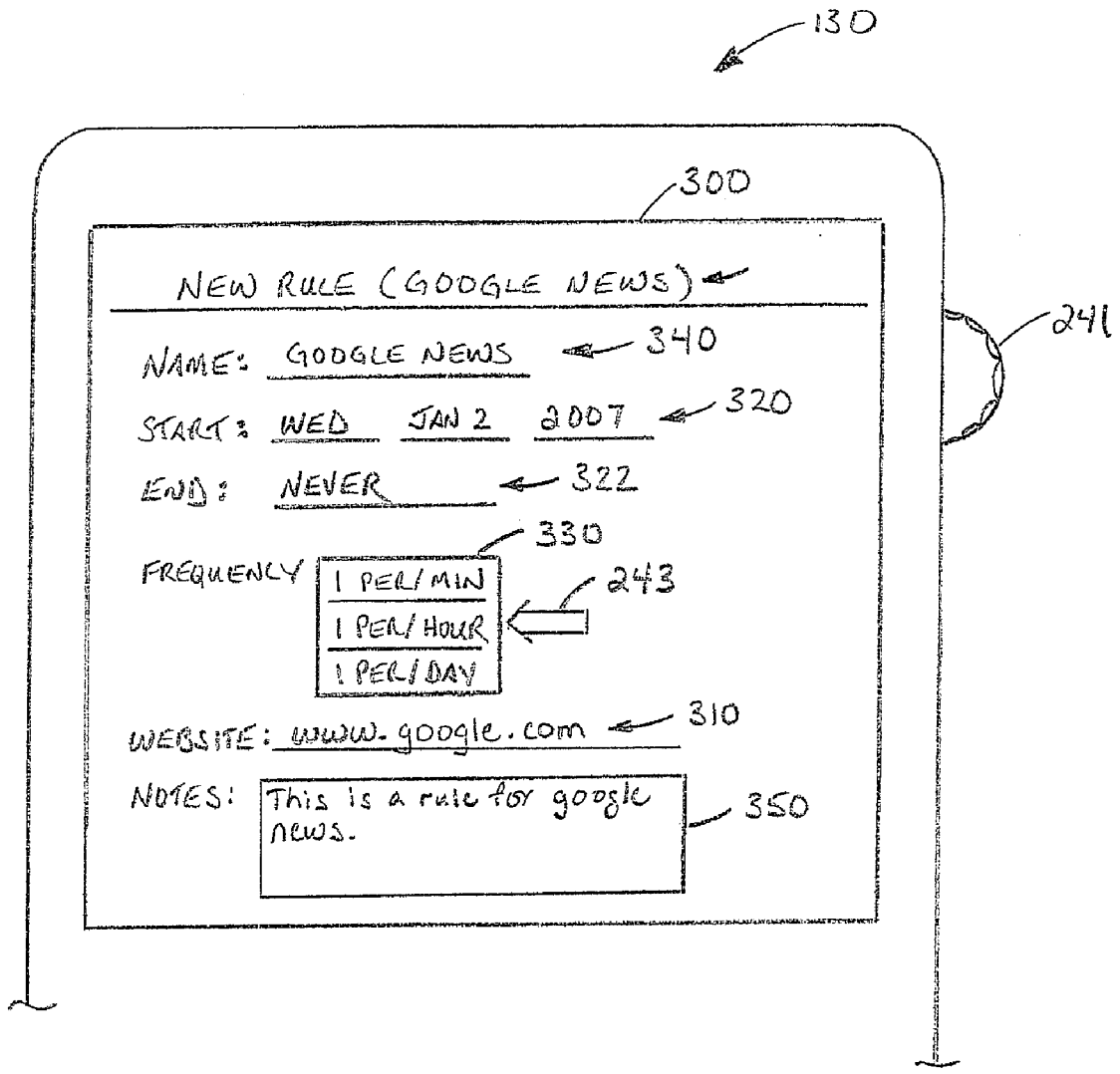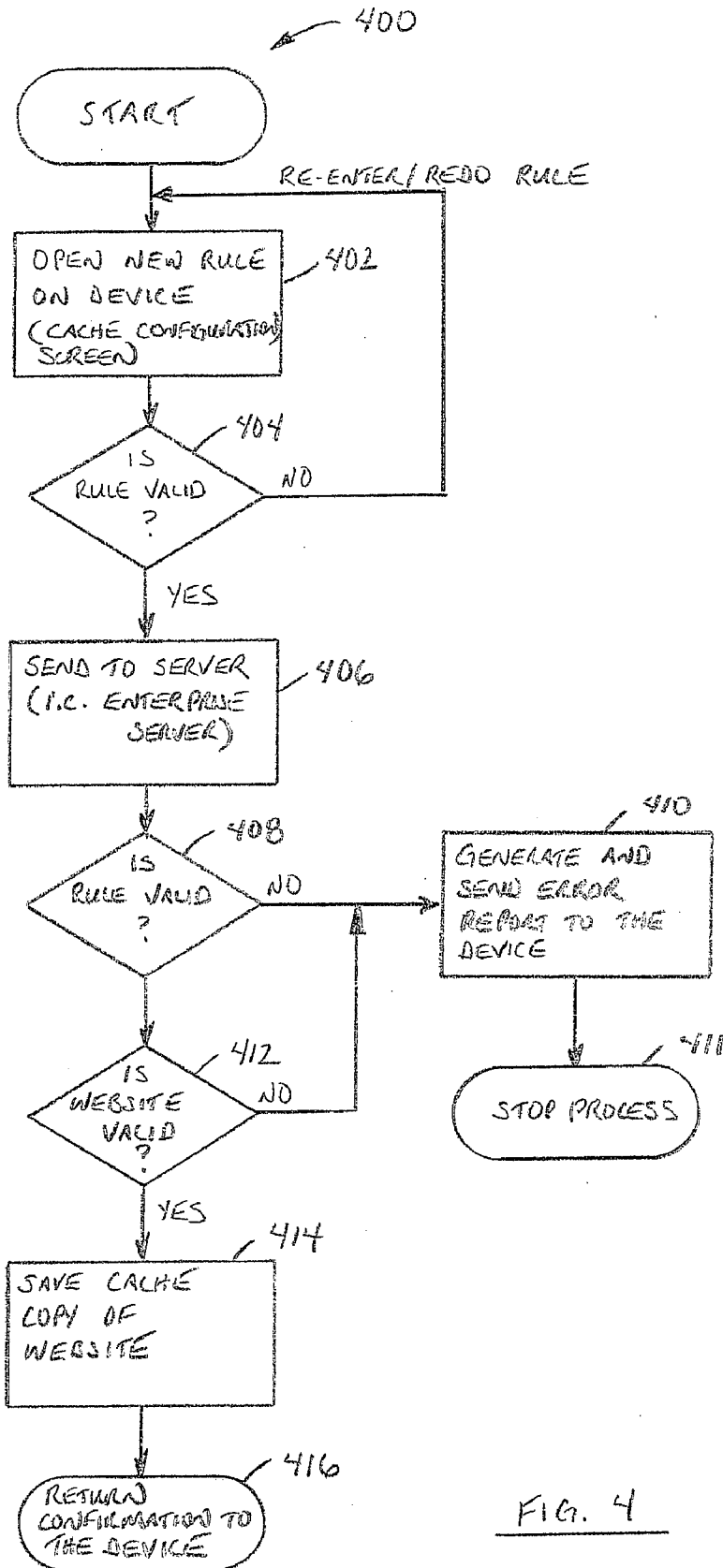416

FIG. 4

METHOD AND SYSTEM FOR AUTOMATED AND CONFIGURABLE REMOTE CACHE REFRESHES

FIELD OF THE APPLICATION

[0001] The present application relates to wireless packet data service networks, and more particularly, to a method and system for automated or configurable remote cache refreshes for a mobile communication device in a wireless packet data service network.

BACKGROUND OF THE APPLICATION

[0002] In the wireless marketplace, the speed at which data is delivered to a wireless device can distance a company or a product from its competitors. Another trend in the wireless market is the constantly increasing bandwidth being offered by the data networks. With the increasing bandwidth, users are using their devices more and more for higher bandwidth activities, such as browsing the Internet. This in turn is leading to usability problems in end-to-end latency.

[0003] Accordingly, there remains a need for improvements in the art.

SUMMARY

[0004] The present application is directed generally to a method and system for automated and configurable remote cache refreshes for a mobile communication device in a wireless packet data service network.

[0005] Other aspects and features will become apparent to those ordinarily skilled in the art upon review of the following description of embodiments in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Reference will now be made to the accompanying drawings which show, by way of example, embodiments of the methods and systems described herein, and how they may be carried into effect, and in which:

[0007] FIG. 1 shows in diagrammatic form an exemplary network environment suitable for operating an embodiment according to the present application;

[0008] FIG. 2 shows in schematic form an exemplary mobile wireless communication device which is capable of communicating within the network environment of FIG. 1;

[0009] FIG. 3 shows in diagrammatic form a screen shot for operating a mobile communications device in accordance with an embodiment; and

[0010] FIG. 4 shows in flowchart form a process for providing cache refreshes for use by a mobile communications device according to an embodiment.

[0011] Like reference numerals indicate like or corresponding elements in the drawings.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0012] Embodiments of the present invention are generally directed to a method and system for automated and configurable remote cache refreshes for a mobile communication device in a wireless packet data service network.

[0013] According to one broad aspect, there is provided a method for enhancing downloading of a webpage to a mobile communication device, the method comprises the steps of: designating a webpage for the mobile communication device; retrieving the requested webpage from a web server; storing the requested webpage in a cache; refreshing said cache; transmitting a copy of the webpage from the cache to the mobile communication device.

[0014] According to another broad aspect, there is provided a server for providing webpage downloads to one or more devices in a communication network, the system comprises: means for designating a webpage for the one or more devices; means for retrieving the designated webpage from a web server; means for storing the retrieved webpage in a cache; means for refreshing the cache; means for transmitting a copy of the webpage from the cache to the one or more devices.

[0015] According to a yet another broad aspect, there is provided a system for enhancing the downloading of a webpage to a handheld device coupled to a wireless communication network, the system comprises: a browser running on the handheld device and having a component for designating a webpage; an intermediary server coupled to the wireless communication network and having a component for retrieving the designated webpage from a web server; the intermediary server including a cache for storing a copy of the webpage, and the intermediary server having a component for refreshing the cache.

[0016] According to a further aspect, there is provided a computer program product comprising a storage medium configured to store executable instructions for performing operations associated with cache refreshes in accordance with embodiments as described in more detail below.

[0017] Reference is first made to FIG. 1, which shows in diagrammatic form an exemplary network environment 100 wherein an embodiment as described herein may be practiced. The network environment 100 comprises a wireless network 110, the Internet 112, a wireless gateway 114, a wireless infrastructure 116, and an enterprise server 120. The wireless network 110 serves a plurality of users, each having a mobile communication device (MCD) 130, indicated individually as 130-1, 130-2, . . . 130-n.

[0018] The wireless gateway 114 and the wireless infrastructure 116 provide a link between the Internet 112 and the wireless network 110. The wireless infrastructure 116 determines the most likely network for locating a given user and tracks the users as they roam between countries or networks. A message is then delivered to the mobile communication device 130 via wireless transmission, typically at a radio frequency (RF), from a base station in the wireless network 110 to the mobile device 130. The wireless network 110 may comprise any wireless network over which messages may be exchanged with a mobile communication device.

[0019] The wireless infrastructure 116 includes a series of connections to the wireless network 110. These connections could be Integrated Services Digital Network (ISDN), Frame Relay or T1 connections using the TCP/IP protocol used throughout the Internet. As used herein, the term "wireless network" is intended to include three different types of networks, those being (1) data-centric wireless networks, (2) voice-centric wireless networks and (3) dual-mode networks that can support both voice and data communications over the same physical base stations. Combined dual-mode networks include, but are not limited to, (1) Code Divisional Multiple Access (CDMA) networks, (2) the Group Special Mobile or the Global System for Mobile Communications (GSM) and the General Packet Radio Service (GPRS) networks, and (3) future third-generation (3 G) networks like Enhanced Data-

rates for Global Evolution (EDGE) and Universal Mobile Telecommunications Systems (UMTS). Some older examples of data-centric networks include the Mobitex.™. Radio Network and the DataTAC.™. Radio Network. Examples of older voice-centric data networks include Personal Communication Systems (PCS) networks like GSM, and TDMA systems.

[0020] The enterprise server **120** may be implemented, for example, on a network computer within a firewall **118** for a corporation, a computer within an ISP system or the like. The enterprise server **120** provides an interface for email exchange over the Internet **112** and web access on the Internet **112** for mobile communication devices **130** equipped with a browser or having browser capability as will be described in more detail below.

[0021] The enterprise server **120**, for example, implemented as a BlackBerry® Enterprise Server or BES, comprises a software module running on a server that acts as the centralized link between the mobile wireless communication devices **130**, the wireless networks **110** and the enterprise applications. The server **120** integrates with enterprise messaging (e.g. Microsoft Exchange email system) and collaboration systems to provide the users of the mobile communication devices **130** with access to email, enterprise instant messaging and personal information management tools. All data between applications and the mobile communication devices **130** flows centrally through the enterprise server **120**. As shown in FIG. **1**, the enterprise server **120** comprises a router **122**, a dispatcher **124** and a Mobile Data Services-Connection Services (MDS-CS) module or system **126**.

[0022] The router **122** is designed to connect to the wireless network **110** to route data to and from the mobile wireless communication devices **130**. The dispatcher **124** is designed to compress and encrypt the data communications for the mobile communication devices **130**. The dispatcher **124** routes the data through the router **122** to and from the wireless network **110**. The Mobile Data Services module **126**, for example, the BlackBerry® MDS™ Connection Service, functions as a gateway and is designed to manage interactions and requests between mobile wireless communication devices **130** (for example, Blackberry® handheld devices) and enterprise applications. The Mobile Data Services system **126** enables always-on/push-based access to enterprise applications and information using the mobile communication device **130**, browser and software development tools. The MDS **126** provides connectivity (i.e. HTTP/HTTPS) to the Internet **112**. In addition, the MDS **126** provides an extensible and secure interface for extending corporate applications and the corporate Intranet based on existing web standards.

[0023] Reference is next made to FIG. **2**, which shows in more detail an exemplary implementation of the mobile communication device **130**. The mobile communication device **130** comprises a central processing unit or CPU **210**. The CPU **210** operates under the control of a program (i.e. firmware or software) stored in program memory **220**. The CPU **210** is also provided with data memory **230**. The CPU **210** is also operatively coupled to a keyboard **240** and a track wheel **241** or a trackball (not shown), a display module **242** and an audio transducer or speaker **244**. In addition to the program executable code providing for performing the functions associated with the operation of the mobile communication device **130**, the program memory **220** includes a browser program **222**. The browser program **222** allows a user to access web pages on the Internet **112** using the mobile communication

device **130**, i.e. utilizing a graphical user interface comprising, for example, the keyboard **240** and the display module **242** and/or the track wheel **241**.

[0024] As shown, the mobile communication device **130** includes a RF, demodulation/modulation and decoding/coding circuits **250**, and a suitable RF antenna **252**. The RF demodulator/modulator and decoder/coder circuits **250** and the RF antenna **252** are operatively coupled to the CPU **210** and provide an interface for wireless communication with the wireless network **110**. The particular implementation details of the RF circuits will be within the understanding of those skilled in the art, and is therefore not described in further detail.

[0025] To browse the Internet, the user invokes the browser program **222** in the mobile communication device **130** and using the graphical user interface (i.e. the display **242**, the keyboard **240** and/or a thumb-operated track wheel **241**) enters the URL or a bookmark for a website of interest, for example, http://www.cnn.com. The browser **222** converts the user entry into a HTTP request and sends the request to the enterprise server **120**. The enterprise server **120**, i.e. the MDS-CS **126**, relays the HTTP request to the web server, for example, web server **132-1** for "CNN.com". In response to the request, the web server **132-1** returns the requested or corresponding webpage, which is relayed by the MDS-CS **126** to the mobile communications device **130**. Similarly, if the user wishes to access another website, for example, http://www.google.com, on web server **132-2**, the HTTP request from the mobile communication device **130** is relayed by the MDS-CS **126** to the web server **132-2**.

[0026] The originating client, for example, a web browser, is typically referred to as the "user agent". The destination server stores resources, such as, HTML files and images, and is typically referred to as the "origin server". In between the user agent and the origin server there may be several intermediaries, for example, proxies and gateways. In the context of the present application, the mobile handheld devices **130** comprise user agents, the enterprise server or module **120** comprises an intermediary server or MDS-CS module **126**, and the web servers **132** comprise origin servers. According to an embodiment, the intermediary server is located or configured behind a firewall.

[0027] According to an embodiment, the enterprise server **120** includes a cache module indicated generally by reference **140**. The cache module **140** in conjunction with a software or code object, e.g. a cache controller, **142** provides a mechanism to cache one or more web pages or web sites selected or configured by one or more of the users. According to another aspect, the web pages or web sites are refreshed and the cache **140** is updated. According to another aspect, the refresh rate may be specified or configured by the user of the mobile communication device **130**, as will also be described in more detail below with reference to FIG. **3** and FIG. **4**.

[0028] Referring still to FIG. **1**, the MDS **126** includes a module for processing the web pages or information received from the web servers **132**. The processing module **128** includes one or more code components for manipulating or altering, for example, compressing, optimizing and/or transcoding, the webpage or information from the web server **130** before transmission to the mobile communication device **130**. The compression component compresses the website data for viewing on a small screen, such as the display **242** (FIG. **2**) in the mobile communication device **130**. The compression component may also provide image compression for

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optimizing images in the webpage downloaded to the mobile communications devices **130**. For example, an image for a webpage may be compressed from 256K to about 4K for downloading to the mobile device **130**. It will be appreciated that compression provides better utilization of the bandwidth between the server **120** and the mobile communication devices **130**. The transcoding component transcodes the data, for example, by removing garbage HTML. According to an embodiment, the webpage is processed by the processing module **128** prior to be stored or cached in the cache module **140** as described in more detail below.

[0029]   Reference is made to FIG. **3**, which shows a screen shot of a cache configuration screen or window **300** in the mobile communication device **130**. The cache configuration screen **300** allows the user to configure the webpage cache module **140** and/or the webpage refresh rate. The cache configuration screen **300** is selected by the user, for example, as a menu item and displayed on the display module **242** (FIG. **2**), and information and/or configuration parameters are entered using the keyboard **240** (FIG. **2**) and/or the track wheel **241** (FIG. **2**). As shown in FIG. **3**, according to one exemplary embodiment, the cache configuration screen **300** comprises a website input field **310**, a cache/refresh start field **320**, and a cache/refresh end field **322**. The cache configuration screen **300** may also include a website update frequency menu box or list **330**, a name display input field **340** and a Notes input field/text box **350**. In operation, the user moves between the various input fields using the track wheel **241** (FIG. **2**) and/or navigation keys on the keypad **240** (FIG. **2**).

[0030]   The cache configuration screen **300** depicts an exemplary configuration for the website: http://www.google. com, as would be entered by a user of the mobile communication device **130**. The user enters the URL for the website of interest, e.g. www.google.com in the website input field **310**. The user enters the start date, e.g. "Wed, Jan. 2, 2007" for caching or refreshing the webpage in the cache/refresh start field **320**. The user may also enter an end date for terminating the caching or refreshing of the webpage in the cache/refresh end field **322**. If the user doesn't enter an end date, the caching/refreshing of the webpage continues indefinitely. The user selects a refresh frequency or rate from the website update frequency list **330**. According to an embodiment, the website update frequency list **330** comprises a 60 second update rate **332**, an hourly update rate **334**, and a daily update rate **336**. As depicted in FIG. **3**, the user has selected the hourly refresh rate **334** using the track wheel **241** to position the cursor **243**. The user enters a user defined name in the name input field **340**, in this example, "Google News". The user can enter a name for the rule in the Notes input field **350**. The cache configuration screen **300** may include a title bar **352** for displaying the user defined name, e.g. "Google News", in addition to an indication (e.g. "New Rule") that a new rule has been entered.

[0031]   In operation and according to an embodiment, the webpage is refreshed and cached by the server **120** prior to being transmitted to the mobile communication device **130**, i.e. based on the website update refresh frequency. According to another aspect, the webpage is refreshed asynchronously at the server **120**, i.e. the server **120** accesses the web server **132**, optimizes and stores an updated copy of the webpage in the cache **140**. The webpage refresh rate at the server **120** may be implemented as a function of the user specified webpage update refresh rate or a system defined parameter in the cache refresh code object or controller module **142**. The copy of the

webpage from the cache **140** is downloaded to the mobile communication device **130**, for example, in response to a user request or input. According to the described exemplary embodiment, the maximum website update frequency rate is limited to once per minute in order to prevent overloading the server with website refreshing. According to another embodiment, a limit may be placed on the number of refreshes allowed for a selected website or for a user, for example, 1000 website refreshes. The limit on the refreshes may be administered by the server **120**, for example, as a code component or object in the MDS-CS **126**. The limit may also be pushed down to the mobile communication device **130** by the server **120**.

[0032]   Reference is made to FIG. **4**, which shows in flow-chart form a process for providing cache refreshes for use by a mobile communications device according to an embodiment. The process is indicated generally by reference **400** starts with a user opening or configuring a new rule on the mobile communication device **130** or the MCD-CS **126** at **402**—for example, using the cache configuration screen **300** as described above with reference to FIG. **3**. A check is made at **404** to determine if the rule is valid. According to embodiment, invalid rules comprise: an invalid start time, i.e. a start time before now; a frequency above the maximum allowed frequency, e.g. more than 1000 refreshes/second; an empty input field, e.g. no entry in the website entry field **310** (FIG. **3**); and any configuration that would cause the desired caching not to occur. If it is found that the rule is not valid, then control returns to **402**, and the user is prompted to change the entry. If the rule is found to be valid in **404**, then the rule for configuring the cache refreshes is sent to the server (i.e. the MDS-CS **126** in the enterprise server **120** in FIG. **1**) at **406**. As shown, another check may be made at **408** to again verify the validity of the rule. This provides a check that the correct data was sent to the server. If the rule is not valid, e.g. the data has been corrupted, then an error message is transmitted to the mobile communication device at **410** and the process is stopped at **411**. If the rule is valid, then the content of the rule is tested at **412**. According to one embodiment, the rule is tested for a request to a valid website. If the rule content is not valid, e.g. does not refer to a valid website, then an error is generated and the process is stopped at **410** and **411**. If the content of the rule is valid, then website specified in the rule is accessed and a cache is saved in memory, e.g. the cache module **140** on the enterprise server **120** in FIG. **1**, as indicated at **414**. A successful cache request response is returned to the mobile communication device in **416**.

[0033]   As shown in FIG. **1**, the cache module **140** is configured or implemented in memory in the MDS-CS **126**. According to another embodiment, the cache module **140** may be configured as part of a memory block **144** in the enterprise server **120**.

[0034]   While the embodiments according to the present application have been described in the context of mobile communication devices, the embodiments may be extended or find application in other client-server configurations, for example, a desktop computer and a remote Internet proxy server.

[0035]   The present invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. Certain adaptations and modifications of the invention will be obvious to those skilled in the art. Therefore, the presently discussed embodiments are considered to be illustrative and not restrictive, the scope of the

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invention being indicated by the appended claims rather than the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed is:

1. A method for enhancing downloading of a webpage to a mobile communication device, said method comprising the steps of:

    designating a webpage for the mobile communication device;

    retrieving the designated webpage from a web server;

    storing said designated webpage in a cache;

    refreshing said cache;

    transmitting said webpage from said cache to the mobile communication device.

2. The method as claimed in claim 1, wherein said step of storing includes manipulating said webpage for transmission to the mobile communication device.

3. The method as claimed in claim 2, further including the step of receiving a refresh frequency from the mobile communication device, and said step of refreshing being performed based on a said refresh frequency.

4. The method as claimed in claim 3, wherein said refresh frequency is defined at the mobile communication device.

5. The method as claimed in claim 3, wherein said refresh frequency includes a start time and an end time.

6. The method as claimed in claim 1, wherein said step of designating a webpage comprises receiving a webpage input from one of the one or more mobile communication devices.

7. The method as claimed in claim 1, wherein a webpage is designated according to a rule, and said rule being defined according to a user of one of said mobile communication device.

8. A server for providing webpage downloads to one or more devices in a communication network, said server comprising:

    means for designating a webpage for the one or more devices;

    means for retrieving the designated webpage from a web server;

    means for storing said retrieved webpage in a cache;

    means for refreshing said cache; and

    means for transmitting a copy of said webpage from said cache to the one or more devices.

9. The server as claimed in claim 8, wherein said means for designating a webpage comprises an input component for defining a webpage according to a rule.

10. The server as claimed in claim 9, wherein said means for refreshing comprises a periodic refresh having a refresh frequency.

11. The server as claimed in claim 10, wherein said refresh frequency is defined at the device.

12. A system for enhancing the downloading of a webpage to a handheld device coupled to a wireless communication network, said system comprising:

    a browser running on the handheld device and having a component for designating a webpage;

    an intermediary server coupled to the wireless communication network and having a component for retrieving said designated webpage from a web server;

    said intermediary server including a cache for storing a copy of said webpage; and

    said intermediary server having a component for refreshing said cache.

13. The system as claimed in claim 12, wherein said intermediary server includes a component for processing said retrieved webpage for transmission to the handheld device.

14. The system as claimed in claim 13, wherein said processing component includes a component for transcoding said retrieved webpage.

15. The system as claimed in claim 12, wherein said component for refreshing said cache is responsive to a refresh rate.

16. The system as claimed in claim 15, wherein the handheld device includes a configuration screen for configuring said refresh rate, said configuration screen including a webpage input, a refresh frequency parameter and a starting time.

17. The system as claimed in claim 16, wherein said intermediary server includes a component for updating said webpage prior to transmitting said updated webpage to the handheld device.

18. The system as claimed in claim 16, wherein said component for refreshing said cache operates periodically to retrieve a copy of said webpage from said web server and refresh the copy of said webpage in said cache.

19. The system as claimed in claim 12, wherein said intermediary server is associated with an enterprise server.

20. The system as claimed in claim 12, wherein said intermediary server is located behind a firewall.

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